MINOR NOTICES.

Japanese vegetation.—Professor MIYOSHI, of the University of Tokyo, has begun the publication of photogravures of Japanese vegetation,[6] to represent wild and cultivated plants and plant societies. Each picture is on a separate sheet of cardboard 20.5×27^{cm}, the size of the print being 16×23^{cm}. Accompanying the illustrations is a descriptive text in both English and Japanese. The author has not yet determined the number of plates to be issued. So far, two parts have appeared, part I containing eight plates of cultivated and semi-cultivated plants, and part II containing eight illustrations of the vegetation of the island of Nikko.

The illustrations are well chosen and well made. Among the most effective and characteristic are the long avenues of giant mountain cherry trees, gorgeous with their spring blossoms, the graceful bamboos bending beneath their burden of winter snow, and the forest vegetation around the Hannya waterfall. The descriptive text is precise, and interspersed by interesting remarks which show that the author has an eye for color and setting.

It is to be hoped that the series may be continued to give us many more illustrations of the flora of this interesting country.—F. C. NEWCOMBE.

A botanical cyclopedia.—An illustrated German dictionary of botanical terms has appeared under the editorship of CAMILLO K. SCHNEIDER,[7] with the assistance of a number of other German botanists. This volume of almost 700 pages presents much more than a list of definitions, for there are illustrated descriptions of the morphology and minute structures of organs, of the sort one would expect to find in a cyclopedia. The terms, of course, are those employed in the German language, and the work will not take the place, for the English or American botanist, of JACKSON'S excellent *Glossary of botanic terms*. —B. M. DAVIS.

NOTES FOR STUDENTS.

Chemotaxis of spermatozoids.—The chemotaxis of the spermatozoids of Isoetes has been studied by SHIBATA.[8] In *Isoetes japonica*, which was used for the study, the sporangia ripen in autumn. Microspores, sown in tap water in Perti dishes late in November, begin to germinate about the middle of January. The duration of the swarming movements of the spermatozoids is shorter than in the ferns, vigorous movements lasting only about five minutes; some movement of

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6 MIYOSHI, M., Atlas of Japanese vegetation. With explanatory text. Tokyo: Maruzen Kabushiki Kaisha. 1905.

7 SCHNEIDER, C. K., Illustriertes Handwörterbuch der Botanik. Imp. 8vo. pp. 690. *figs. 341*. Leipzig: Wilhelm Engelmann. 1905. *M* 16.

8 SHIBATA, K., Studien über die Chemotaxis der Isoetes-Spermatozoiden. Jahrb. Wiss. Bot. 41:561–610. 1905.

the spermatozoid, however, may continue for ten or fifteen minutes, and of the cilia for five minutes longer. PFEFFER'S capillary method was used in the experiments. The principal headings are: position chemotaxis, relation between the intensity of the stimulus and extent of the reaction, repulsion by free acids and alkalis, negative chemotaxis with the ions of heavy metals, repulsive effect of alkali salts, behavior with osmotically acting substances, repulsive effect of ions of certain organic acids, the action of narcotics, theoretical, and review.

Malic acid acts as a strong topochemotactic stimulus and may be regarded as the specific stimulant for the spermatozoids of Isoetes, although certain other substances also exert some topochemotactic influence. Free malic acid in weak solutions exerts a positive chemotactic influence, but in stronger solutions a negative one. The salts of various metals act as negatively chemotactic stimuli, as do also the anions of di- and tribasic organic acids, including malic acid. The positive chemotaxis with malic acid is of a typically topotactic nature. The reaction consists in a turning of the body axis of the spermatozoid and a movement toward the source of stimulation. Whether the structure for the perception of chemotactic stimuli consists of the whole body of the spermatozoid or only of localized portions of it is not yet determined.—C. J. CHAMBERLAIN.

Tuberization.—The causes of tuberization still furnish a field for study. BERNARD first supposed that *Fusarium Solani* was the endophytic fungus of the potato; this has since been disproved by GALLAUD and by BERNARD himself, but the identity of the fungus is still undetermined. H. JUMELLE[9] has been conducting experiments on *Solanum Commersoni*, a tuber-bearing species related to the potato, but as yet his results are largely negative. The chief interest attached to his studies are occasioned by the fact that *S. Commersoni* has small slowly developing tubers placed on long stolons; these are the very characters which the potato is said to have had when first introduced into Europe, before the endophytic fungus became sufficiently abundant. *S. Commersoni* was infected by fungi from *S. tuberosum*, but, as stated above, with negative results. JUMELLE thinks that with suitable infection, it may be possible to secure tubers like those of the potato, and further experiments are in progress. It should be said that GALLAUD thinks that BERNARD has not yet isolated the true tuber-forming fungus.—H. C. COWLES.

Two parasitic fungi.—KLEBAHN[10] has worked out the life histories of two common species of the so-called Imperfecti group. The first of these is the common elm fungus, *Phleospora Ulmi* (Fr.) Wallr. This is connected with an ascomycetous form, which appears on the infected dead leaves during the winter and ripens in spring, when the spores are ejected and infect the young

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[9] JUMELLE, H., Del'influence des endophytes sur la tubérisation des Solanum. Rev. Gén. Bot. **17**:49–59. 1905.

[10] KLEBAHN, H., Untersuchungen über einige *Fungi imperfecti* unddie zugehörigen Ascomycetenformen. I. u. II. Jahrb. Wiss. Bot. **41**:485–560. *figs. 75.* 1905.